of metallic films obtained by disintegration of cathodes and of certain liquids in motion, and investigated the optical properties of electrified quartz. With Röntgen he was able to show a slight magneto-optic rotation in several vapours and compressed gases, which even Faraday had not been able to detect, and, on the other hand, its enormous value in iron, cobalt, and nickel. The latter will be known to coming generations as "Kundt's phenomenon." Last, but not least, he succeeded in determining the refractive indices of metals, which he was able to obtain in the shape of extremely thin prisms.

His experimental work, of which the above gives but an incomplete summary, is throughout characterised by the greatest ingenuity in the selection of means to attain definite ends, by the rare quality of ever-watchful self-criticism, which prevented his running away with himself. He possessed that instinctive and immediate power of discriminating the broad way of progress into the unknown from the stray paths leading into tangled wilderness, a faculty which he used to call the pioneering scent of the experimenter.

Space forbids an adequate account of what Kundt personally was to his family, his friends, and his pupils. The latter, a great number of whom are scattered throughout the civilised world, were attached to him by the strongest ties of a scientific and private character, and lost no chance of showing the high esteem they felt for him. They owe a life-long debt of gratitude to the great experimenter, who to most of them was not only a teacher but also a personal friend, ever ready to render help and advice based on his varied experience of scientific life.

H. du Bois.

NOTES.

The annual meeting for the election of Fellows into the Royal Society was held on Thursday last, when the following gentlemen were elected:—Mr. William Bateson, Mr. G. A. Boulenger, Dr. J. R. Bradford, Prof. H. L. Callendar, Prof. W. W. Cheyne, Mr. R. E. Froude, Prof. M. J. M. Hill, Prof. J. V. Jones, Mr. E. H. Love, Mr. Richard Lydekker, Mr. F. C. Penrose, Mr. D. H. Scott, Rev. F. J. Smith, Mr. J. W. Swan, Mr. V. H. Veley.

Prof. Percy Frankland, F.R.S., has been elected to the chair of chemistry and metallurgy in Mason's College, Birmingham, rendered vacant by the resignation of Dr. Tilden.

We regret to announce the death, at the age of sixty-seven, of Prof. W. D. Whitney, well known for his philological researches.

We are requested to state that a British Committee, of which Sir Douglas Galton, K.C.B., F.R.S., is the chairman, and Prof. W. H. Corfield is the treasurer, has been formed to further the interests in this country of the Eighth International Congress of Hygiene and Demography, which is to be held in Budapest, from September 1 to 8 of this year. Any information may be obtained about the Congress from the Hon. Secretary, Dr. Paul F. Moline, 42 Walton Street, Chelsea, S.W.

The University of Halle will celebrate its second centenary on August 2nd, 3rd, and 4th of this year.

Sir Spencer Wells has been elected a Fellow of the Hungarian Academy of Sciences.

M. d'Arsonval has been elected a member of the Section de Médecine et Chirurgie of the Paris Academy of Sciences, in succession to the late Dr. Brown-Sequard.

The death is announced of Dr. E. Sperk, Director of the Imperial Institute of Experimental Medicine, St. Petersburg, and of Prof. Fischer, Chief of the Royal Prussian Geodetic Institute.

Dr. H. Molisch has been appointed Director of the Institute of Vegetable Physiology at Prague, in the place of the late Prof. G. A. Weiss.

M. P. Sinteins has just started on a journey of botanical exploration in Eastern Armenia.

Dr. C. V. Riley has resigned the post of entomologist to the U.S. Department of Agriculture, on account of failing health.

It is reported by the Eastern Extension, Australasia and China Telegraph Company, that a plague has broken out at Hong Kong. No particulars as to the epidemic have been received, but its serious nature may be gathered from the report that fifteen hundred deaths have already occurred, and that this list is increased by nearly one hundred every day. It is said that half the native population, numbering about one hundred thousand, have left the colony, and thousands are following them daily.

A violent hailstorm visited Vienna on Thursday last, shortly before seven o'clock in the morning. The hail was preceded by a heavy fall of rain, and accompanied by slight displays of sheet lightning. In the course of a few minutes the streets were covered with a thickness of several inches of hailstones. It is said that upwards of one hundred thousand windows were smashed by the hail; numerous trees were entirely stripped of their foliage, and most outdoor plants within the area of fall were destroyed. The hailstones were, on the average, about the size of hazel-nuts. During the storm the temperature dropped to 10° Réaumur (54° Fahr.), but shortly afterwards the thermometer rose a few degrees. Similar storms are reported from various districts in Hungary and Croatia.

The New York members of the London Society of Chemical Industry have drawn up a petition requesting permission from the Council to form a local section. This is a step towards the realisation of the scheme suggested by Dr. Armstrong in his recent address to the Chemical Society.

The Iron and Steel Institute has issued its provisional programme for the Brussels meeting, which is to be held August 20 to 24. There will be a reception by the Local Committee on the 20th, reading and discussion of papers on the mornings of 21st and 22nd, a visit to the Antwerp International Exhibition on the afternoon of 21st, a visit to the Mariemont Collieries and Couillet Steel-works at Charleroi on the 23rd, and a visit to the works of the Cockerill Company, at Seraing, and the Angleur Steel-works, at Liége, on the 24th.

In connection with the recent foundation of a Research Fellowship in Chemical Pharmacology by the Court of the Salters' Company, the Research Committee of the Pharmaceutical Society announces that the selection of the Salters' Company's Research Fellow will take place on July 3 next. Written applications for the Fellowship must be received by the Director of the Research Laboratory, 17, Bloomsbury Square, before June 30.

At the meeting of the American Academy, on May 8, the following officers were elected to serve during the coming year: President, Prof. Josiah P. Cooke; Vice-President, Mr. Augustus Lowell; Corresponding Secretary, Prof. Charles L. Jackson; Recording Secretary, Mr. William Watson; Treasurer, Mr. Eliot C. Clarke; Librarian, Mr. Henry W. Haynes; Councillors, Messrs. William R. Livermore, Benjamin O. Peirce, Benjamin A. Gould, Henry P. Walcott, Benjamin L. Robinson, Henry W. Williams, J. R. Thayer, T. W. Higginson, and Andrew M. Davis.

THE preliminary programme of the forty-third meeting of the American Association for the Advancement of Science, to be held in Brooklyn, from August 15 to 24, under the presidency of Dr. D. G. Brinton, has been issued. The officers of the various sections are as follows:—Section A (Mathematics and Astronomy): Vice-President, Prof. George C. Comstock; Secretary, Prof. Wooster C. Beman. Section B (Physics): Vice-President, Mr. William A. Rogers; Secretary, Mr. Benj. W. Snow. Section C (Chemistry): Vice-President, Mr. Thomas H. Norton; Secretary, Prof. S. M. Babcock. Section D (Mechanical Science and Engineering): Vice-President, Mr. Mansfield Merriam; Secretary, Mr. John H. Kinelay. Section E (Geology and Geography) Vice-President, Mr. Samuel Calvin; Secretary (vacancy to be filled). Section F (Zoology): Vice-President (vacancy to be filled); Secretary, Prof. William Libbey. Section G (Botany): Vice-President, Mr. Lucien M. Underwood; Secretary, Prof. Charles R. Barnes. Section H (Anthropology): Vice-President, Mr. Franz Boaz; Secretary, Mr. Alex. F. Chamberlain. Section I (Economic Science and Statistics): Vice-President, Mr. Henry Farquhar; Secretary, Mr. Manly Miles. The following subjects of addresses by the Vice-Presidents are announced:—Physics: "Obscure Heat as an Agent in producing Expansion and Contraction in Metals." Anthropology: "Human Faculty as determined by Race." Geology and Geography: "Some Points in Geological History illustrated in North-Eastern Iowa." Economic Science and Statistics: "A Stable Monetary Standard." Mathematics and Astronomy: "Binary Stars." Botany: "The Evolution of the Hepaticæ." Chemistry: "The Battle with Fire." Mechanical Science and Engineering: "Paradoxes in the Resistance of Materials."

THE affiliated societies holding meetings during the meeting of the Association are:—The Geological Society of America (President, Prof. T. C. Chamberlain; Secretary, Prof. H. L. Fairchild); Society for Promotion of Agricultural Science (President, Mr. L. O. Howard; Secretary, Mr. William Frear); Association of Economic Entomologists (President, Mr. L. O. Howard; Secretary, Mr. C. P. Gillette); Association of State Weather Service (Secretary, Mr. Robert E. Kerkham); Society for Promoting Engineering Education (President, Prof. De Volson Wood; Secretary, Prof. J. B. Johnson); American Microscopical Society (President, Dr. Lester Curtis; Secretary, Dr. W. H. Seaman); American Chemical Society (President, Prof. H. W. Wiley; Secretary, Prof. Albert C. Hale); American Forestry Association (President, Prof. B. E. Fernow; Secretary, Mr. J. D. W. French); the Botanical Club (President, Prof. William P. Wilson; Secretary, Mr. Thomas H. McBride); the Entomological Club (President, Mr. C. J. S. Bethune; Secretary, Mr. C. L. Marlett). Geological, mineralogical, botanical, zoological, and engineering excursions have been organised, and arrangements are being made by the American Forestry Association to enable members to proceed from Brooklyn at the close of the session to the White Mountains to attend a Forestry Congress. Special invitations have been extended to distinguished European men of science, and it is announced that properly-accredited members of all National Associations for the Advancement of Science attending a meeting of the American Association are entitled to register without fee as members for the coming meeting. There is every prospect that the meeting will be a very successful one. Information relating to membership and papers can be obtained from Mr. F. W. Putnam, Permanent Secretary, Salem, Mass. All matters relating to local arrangements are managed by Prof. George W. Plympton, Local Secretary, 502 Fulton Street, Brooklyn, N.Y.

THE revival of exploration by Frenchmen has led to the establishment of a series of lectures on scientific subjects to intending travellers at the Natural History Museum in Paris, of which the most recent, a discourse on comparative anatomy, by M. H. Beauregard, appears in the current number of the *Revue Scientifique*. This lecture was originally undertaken by Prof. Georges Pouchet, whose untimely death deprives the French scientific world of one of their most laborious and successful travelling naturalists. The lecturer attributed the lack of attention to comparative anatomy on the part of most travellers to the fact that in making collections they aimed rather to supply museums with attractive specimens than to provide specialists with the material for study and research.

A PLAN of Timbuktu, sent by an officer of the French expedition, was presented to a recent meeting of the Paris Geographical Society, and is reproduced in the last number of the *Comptes Rendus* of that Society. The town has about 12,000 inhabitants, but its commercial prosperity has been destroyed by recent Tuareg raids, many of the buildings being in ruins, although from a distance its large pyramidal mosques give it an imposing appearance. The town is surrounded outside the walls by mounds of dried filth and putrefying animal remains. The desert lies all round, but on the west side there is an extensive pond gradually undergoing desiccation, and several small pools whence the water-supply is obtained.

THE Ethnological Museum at Berlin has just published the second part of Mr. Hrolf Vaughan Stevens' great study of the people of the Malay Peninsula, under the title "Materialen zur Kenntniss der wilden Stämme auf der Halbinsel Malaka," edited by Albert Grünwedel. This part contains a short account of the Negritoes of the Malay peninsula, and a full discussion of the mythology and religion of the Orang Panggang, illustrated by numerous drawings of ceremonial accessories, and particularly the curiously inscribed bamboo-rods called *penitah*, which are buried with the dead to serve as passports in the other world. A long glossary of the Orang-hutan dialects is given in conclusion, being compiled from the records of all travellers who have studied the Malay languages. The value of this glossary is enhanced by the actual renderings of the various authorities being preserved in the different European languages in which they wrote.

THE Weather Bureau of the United States has published its first volume of results of meteorological observations for the years 1891 and 1892, continuing the series formerly published by the Signal Service, together with other climatological tables and special reports of general interest. The work contains 528 large quarto pages, with illustrations and plates, and includes hourly means for 28 stations, with comprehensive and plainly printed monthly and annual summaries at about 170 stations. Prof. C. F. Marvin gives a very full description of the various instruments in use, and Prof. C. Abbe contributes a paper on instrumental corrections and methods of reduction. Both these reports supply much valuable information which will be found very useful to the general public. The work will be widely distributed, as we see that no less than 9000 copies have been printed.

WE believe it is generally known that the Central Observatory of Moncalieri has for many years published a *Bollettino Mensuale*, which is the recognised organ of the Italian Meteorological Society. The bulletin contains the monthly results of a large number of meteorological stations in the Alps, the Appennines, and other parts of Italy, summaries of the proceedings of the Italian and other meteorological societies, and bibliographical notices. In addition to the above, there are articles by members of the Italian Meteorological Society and others on various subjects of scientific interest. The number for May contains a note by Prof. G. Buti on Dr. von Bezold's thermodynamics of the atmosphere, and attention is drawn to two phenomena which up to the present time have been but little studied, viz. the supersaturation and the over-cooling of the air in relation to the formation of thunderstorms and variations of barometric pressure; also a note, by Prof. L. Descroix, on the diurnal oscillations of the barometer at Paris, based on twenty years' observations. Prof. Descroix is of opinion that the differences in the variations of the maxima and minima from day to night, in passing from the warm to the cold season, are explained by the changes of conditions of dryness in the lower strata of the atmosphere, in so far as it is due to their expansion and contraction.

THOUGH the destruction of books by insects is not so great here as in India, it is sufficient to give general interest in the result of an inquiry into the means of preservation adopted in Indian museums (*Indian Museum Notes*, vol. iii. No. 3). In the library of the Revenue and Agricultural Department of the Government of India the books are disinfected by pouring a few teaspoonfuls of refined mineral naphtha, or what is known as benzine collas, into the crevices of the binding, and then shutting up the volume for a few days in a close-fitting box to prevent the escape of the fumes. Books so treated have to be afterwards sponged over lightly with a very little of the finest kerosine oil, which should be rubbed off with a cloth before it has time to penetrate into the binding. Dr. George King reports very favourably upon a system adopted for preserving books in the Royal Botanical Gardens, Sibpore. It consists in brushing the books over with a saturated solution of corrosive sublimate made by constantly keeping a few lumps of the poison at the bottom of a jar of alcohol, so that the maximum amount may be absorbed. In the Indian Museum Library the books are kept in close-fitting glass cases with a few ounces of naphthaline upon each shelf, with the result that little or no damage is caused by insects. It appears that the paste used in binding the Indian Museum books is poisoned by adding about half an ounce of sulphate of copper to each pound of paste, while books already infested are disinfected by shutting them up for four or five days in a close-fitting box of loose naphthaline with as much of this substance as possible between the leaves.

ANOTHER new method for determining the pitches of high tuning-forks is described by Herr F. Melde in the current number of *Wiedemann's Annalen*. It is, like the vibroscopic method previously described, independent of the ear, and is based upon the resonance of a rod clamped at one end and vibrating transversely. The laws of vibration of such clamped rods have already been so carefully studied that calculations of pitch, based upon their dimensions and the properties of the material of which they are made, are very reliable. The rods used consisted of hard brass, cast steel, or iron. They were 32 cm. long, 1 cm. broad, and 1·5 or 2 mm. thick. They were firmly clamped in an iron clamp let into a piece of sandstone, care being taken that the jaws of the clamp were strictly in the same plane at right angles to the length of the rod. The tuning-fork tested was mounted in a wooden block, and placed with one prong lightly touching the end of the rod, so that a vibration of the tuning-fork when bowed produced a transverse vibration of the rod. Fine sand was dusted on to the rod. If on bowing the tuning-fork the sand did not arrange itself in straight lines at right angles to the length of the rod, the clamp was shifted until it did. The mode of vibration, and consequently the pitch, was then calculated from the number of such nodal lines produced. An interesting application of the method was the testing of Appunn's tuning-fork apparatus for the determination of the upper limit of audibility. One fork marked 16,384, as determined by the method of beats, gave really only 11,717 vibrations per second. On the other hand, a standard fork by Dr. König, of Paris, of pitch 16,383, was found to give 16,480 by the new method—a good testimony to the accuracy of both determinations. In each case, the results were confirmed by the vibroscopic method.

THE current number of *L'Elettricista* (Rome) contains an interesting description, by Signor Riccardo Arnó, of a new experiment he has performed. As is well known, Prof. Crookes has shown that when an electric discharge is passed through an exhausted tube, and a small windmill is suitably placed in the path of the discharge, a continuous rotation is obtained. This phenomenon suggested to the author to try if he could obtain a similar rotation by placing an exhausted bulb containing a small windmill in a rotating electrostatic field. The rotating electrostatic field was obtained by connecting four upright brass plates to fixed points in the secondary of a large Ruhmkorff coil, through the primary of which an alternating current was passed. In order to try the experiment it was impossible to use an ordinary radiometer with mica vanes, since the author in a previous series of experiments had shown that when a dialectric is placed in a rotating electrostatic field it experiences a force tending to rotate it, in the same sense as the direction of rotation of the field. Hence the author had a special radiometer constructed with thin brass vanes, since it was only by using a windmill made entirely of a metal that he could be sure he had entirely eliminated the direct action of the rotating field on the vanes, and be sure the effect observed was due to the gas remaining in the tube. When the electrostatic field was sufficiently strong, and the surface of the glass vessel containing the vanes well dried, a rotation was obtained in the same direction as that of the field. In order to show that the rotation is not due to direct action on the vanes, the author suspended a similar set of brass vanes, by means of a long silk fibre, in air at the ordinary pressure in the same rotating field, and found that no rotation was produced. When the radiometer is under the influence of the rotating electrostatic field the bulb is uniformly lighted up, so that the number of turns of the vanes could be counted in the dark. The author considers the effect must be due to some action of the rotating field on the molecules of the gas, which tends to increase their velocity in the direction of rotation of the field, and thus in the case when the gas is much rarefied, so that the free path of the molecules is relatively long, the impact of the molecules on the metallic vanes cause the latter to rotate in the same sense as the field.

THE current number of the *Annali dell Istituto d'Igiene di Roma* contains a paper by Dr. Palermo, on the action of sunshine on the virulence of the cholera bacillus suspended in broth and water respectively. The pathogenic property of all the infected solutions was in each case determined by inoculation into guinea-pigs, so that the difference in the toxic character of the contents of the insolated and darkened tubes could be compared with that possessed by the cholera-infected broth or water solutions treated in the ordinary manner. In order to ascertain what was the effect of sunshine on the *number* of cholera bacilli present, agar dish cultures were made of the insolated and darkened tubes respectively; in no single instance, however, could any numerical difference be detected in either set of experiments. That the sunshine had modified the biological character of the bacilli, was shown very strikingly in drop-cultures, for when examined from insolated broth tubes they were found to have been deprived of all power of motility, whilst the characteristic activity was still apparent in such cultures prepared from the darkened tubes. As regards the degree of virulence possessed by the broth cultures, those exposed to sunshine for *less* than three hours invariably killed the animals, whilst when insolation was prolonged for three and a half, four, and four and a half hours respectively, not a single guinea-pig succumbed. The interesting discovery was, moreover, made that those animals which had survived inoculation with the insolated cholera cultures were protected from cholera, for when eight days later they were inoculated with virulent cholera cultures they did not succumb to this disease. The pathogenic properties of the cholera bacillus were removed more quickly by insolation when immersed in water than in broth. It will be remembered that Arloing stated, as far back as 1885, that he had succeeded in reducing virulent anthrax cultures to the condition of vaccine by insolation; but so far as we are aware, Dr. Palermo is the only other investigator who has been able to render animals immune to a disease by the inoculation of insolated pathogenic cultures.

A PAMPHLET on "Dry Methods of Sanitation," by Mr. G. V. Poore, the author of "Essays on Rural Hygiene," has been published by Mr. Edward Stanford.

IN connection with an exhibition of beautiful and curious British and foreign species of butterflies and moths, at his Piccadilly establishment, Mr. William Watkins has issued a descriptive guide to the specimens on view.

THE address on "The Rise of the Mammalia in North America," delivered by Prof. H. F. Osborn at the last meeting of the American Association for the Advancement of Science, and partly reprinted in these columns (vol. xlix. pp. 235, 257, 1893), has been published separately, and can be obtained from Messrs. W. Wesley and Son.

A PRELIMINARY list of the vertebrate animals of Kentucky is contributed by Mr. H. Garman to the *Bulletin* of the Essex Institute, Massachusetts (vol. xxvi. Nos. 1-3). The list is based upon collections and observations made in various parts of Kentucky from points near the eastern limits of the State to Hickman on the Mississippi River.

A VOLUME by Prof. Dwelshauvers-Dery, entitled "Étude Expérimentale Dynamique d'une Machine a Vapeur," has lately been added to the Aide-Mémoire series published at Paris by Gauthier-Villars and by Masson. Two other volumes recently received are "Électricité Appliquée a la Marine," by M. P. Minel, and "La Rectification de L'Alcool," by M. Ernest Sorel.

THE Agent-General for New South Wales has sent us the report of the Department of Public Works for the year 1892. A considerable amount of work was carried out during the year in connection with harbours and rivers and water supply, water conservation and irrigation, roads and bridges and sewerage. The report contains twenty-seven plates illustrating the state of the work in hand and the machinery employed.

THE difficult genera *Rosa* and *Rubus* are the subject of careful study by French botanists. A Rhodological Society has been founded for the purpose of publishing a herbarium of the Roses of France, named by the Belgian rhodologist M. Crépin. Those intending to subscribe are invited to correspond with Dr. Pons, Ille-sur-Têt, Pyrénées Orientales. A publication is also announced with the title *Rubi praesertim Gallici exsiccati*, under the editorship of Prof. Boulay, Rue de Toul, Lille, and M. Bouly de Lesdain, 16, Rue Emmery, Denkerque. We note also the publication of the first fascicle of Messrs. E. F. and W. R. Linton's "Set of British Willows."

FOUR new volumes of the series of reprints published by Engelmann, of Leipzig, viz. Ostwald's "Klassiker der Exakten Wissenschaften," have just appeared. Nos. 46 and 47 deal with the calculus of variation, and contain papers by Joh Bernoulli (1696), Jac Bernoulli (1697), Euler (1744), Lagrange (1762, 1770), Legendre (1786), and Jacobi (1837). Electricians will be interested in No. 52, which contains Galvani's observations on the action of electricity on the muscles of frogs. The twenty-one quaint figures in the text give this volume additional value. Gauss' researches on the intensity of terrestrial magnetism, communicated to the Göttingen Gesellschaft der Wissenschaften in 1832, are reprinted in No. 53 of this very useful series.

AMONG numerous papers recently distributed by the Smithsonian Institution are Prof. S. P. Langley's memoir on "The Internal Work of the Wind" (see NATURE, vol. xlix. p. 273, 1893), and several contributions by Prof. H. F. Osborn to the *Bulletin* of the American Museum of Natural History. One of these is concerned with the fossil mammals of the Upper Cretaceous beds of America, and the conclusions arrived at from a discussion of the upper and lower dentition are the reverse of those expressed by Prof. Marsh on the same fauna. Other recently-issued excerpts from the *Bulletin* referred to are "Artionyx, a new Genus of Ancylopoda," by Prof. Osborn and Dr. J. L. Wortman; "On the Divisions of the White River or Lower Miocene of Dakota," by Dr. Wortman; and "Ancestors of the Tapir from the Lower Miocene of Dakota," by Dr. Wortman and Mr. C. Earle.

MM. J. B. BAILLIÈRE ET FILS, Paris, have published a "Flore de France," by M. A. Acloque, containing the description of all the indigenous species, and illustrated by 2165 small figures representing the characteristic types of genera and sub-genera. The book has been designed to assist in the identification of plants. It appeals, therefore, to those who, when they see a plant, want to know its place in the flora of France. By means of it, local botanists will be able to determine easily the species of plants in their districts, and thus a large amount of useful material with regard to geographical distribution may be got together. Another flora lately published is that of "Nordwestdeutchen Tiefebene" (Engelmann, Leipzig), by Prof. F. Buchenau. This, however, is not so much a work to assist amateur botanists as a work of reference in which all the plants in the region covered are systematically arranged and described.

THREE iodo-sulphides of phosphorus have been prepared by M. Ouvrard, and are described in the June issue of the *Annales de Chimie et de Physique*. The iodide of phosphorus P_2I_4 is not attacked by sulphuretted hydrogen at the ordinary temperature, but at a temperature slightly higher than the melting point of the iodide, about 115°, hydriodic acid is slowly produced, and after a couple of days' heating at this temperature the reaction is usually complete. The product is readily soluble in carbon bisulphide, and the solution deposits crystals of an iodo-sulphide of the composition $P_4S_3I_2$. The reaction proceeds in accordance with the equation, $2P_2I_4 + 3H_2S = P_4S_3I_2 + 6HI$. This new substance forms very well-developed yellow crystals of high refractive power. They are permanent in dry air, but slowly attacked by moisture with elimination of sulphuretted hydrogen. They melt about 106° to a viscous liquid, and about 300° they inflame with evolution of iodine vapour and white fumes of phosphoric anhydride. Cold water only slowly attacks them, but they are rapidly decomposed by hot water. Fuming nitric acid at once induces an explosion accompanied by incandescence. The compound may more easily be prepared by dissolving the constituents in the correct proportions in carbon bisulphide, evaporating and heating to 120° in a current of inert gas, and again dissolving in carbon bisulphide; the solution deposits crystals of the new substance upon evaporation. It may also be at once obtained by dissolving iodine in a solution of sesquisulphide of phosphorus in carbon bisulphide and evaporating. The second iodo-sulphide of phosphorus has the composition PSI or $P_2S_2I_2$, and was obtained by the action of sulphuretted hydrogen upon the tri-iodide of phosphorus, PI_3. A lower temperature than that required for the formation of the compound just described is advisable at first; it should not be much higher than 55°, the melting point of the tri-iodide; before the conclusion of the reaction, however, it may safely be raised to 120°. The solution of the product in carbon bisulphide deposits red crystals of the new compound PSI. These crystals are much more rapidly attacked by moist air than those of the first iodo-sulphide, and the reaction is accompanied by the liberation of fumes of hydriodic acid. They take fire upon warming in the air, disseminating the odour of sulphur dioxide and the violet vapour of iodine. Water dissolves them rapidly, producing trisulphide of phosphorus and hydriodic and phosphorous acids, and sulphuretted hydrogen is subsequently evolved owing to the decomposition of the trisulsphide. The third iodo-sulphide was obtained by reacting with excess of tri-iodide of phosphorus upon the trisulphide. It is deposited from carbon bisulphide in deep red crystals, very rapidly decomposed by moist air, and its composition is P_2SI_4. It thus appears that iodine is capable of replacing more or less of the sulphur contained in the sulphides of phosphorus, although it does not succeed in totally eliminating sulphur from its combination with phosphorus. M. Ouvrard has also obtained several new halogen derivatives of the sulphides of arsenic and antimony. English readers of the original paper cannot but be sorry, however, that M. Ouvrard employs the old notation, which renders it difficult at first sight to follow the equations representing the reactions. The formulæ above given are translated into the modern notation now universally employed in this country and Germany.

The additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*, ♀) from India, a White-throated Capuchin (*Cebus hypoleucus*) from Central America, presented by Mr. F. Erskine Paton; a Grey Ichneumon (*Herpestes griseus*) from India, presented by Miss Florence Marryat; two Common Peafowl (*Pavo cristatus*, ♂ ♀) from India, presented by Mr. A. Tannenbaum; a Puff Adder (*Vipera arietans*) from South Africa, presented by Mr. J. E. Matcham; four Common Snakes (*Tropidonotus natrix*), a Common Viper (*Vipera berus*), British, presented by Mr. Harold Attewell; a Smooth Snake (*Coronella lævis*) British, presented by Mr. Harry Furniss; a Natterjack Toad (*Bufo calamita*), British, presented by Mr. F. Wallace; a Raven (*Corvus corax*), British, presented by Mr. Robert O. Callaghan; two Cape Crowned Cranes (*Balearica chrysopelargus*) from South Africa, four Yellow-bellied Liothrix (*Liothrix luteus*), two Hamadryads (*Ophiophagus elaps*) from India, deposited; an Ashy-black Macaque (*Macacus ocreatus*, ♂) from the East Indies, a Beech Marten (*Mustela foina*) from Russia, a Red and Yellow Macaw (*Ara chloroptera*) from South America, a Yellow-headed Vulture (*Cathartes urubitinga*) from Brazil, a Turkey Vulture (*Cathartes aura*) from America, a Guianan Crested Eagle (*Morphnus guianensis*) from the Amazons, purchased; an English Wild Cow (*Bos taurus*, var.), three Varied Rats (*Isomys variegatus*), a Bennetts Wallaby (*Halmaturus bennetti*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

Report of the Astronomer-Royal for Scotland.—The fourth annual report of Prof. Copeland on the Royal Observatory, Edinburgh, informs us that great progress has been made in the construction of the new Observatory. The masonry of all the buildings is complete, and some parts are ready for the internal fittings.

A comparison of the earlier Edinburgh star places with the catalogue of the *Astronomische Gesellschaft* has shown the necessity of a complete new reduction of the observations, in order to bring them into line with modern practice in this kind of work. For this purpose considerable progress has been made in an investigation of the errors of the transit instrument.

At the request of M. d'Abbadie, of the Paris Academy of Sciences, a bifilar pendulum was temporarily erected on the rock at Calton Hill on March 24. This extremely sensitive instrument, constructed by Mr. Horace Darwin on a principle suggested by Lord Kelvin, indicates the minutest change of level in the foundation to which it is attached. Prof. Copeland hopes shortly to commence a series of systematic observations in conjunction with allied observations made by M. d'Abbadie nearly on the same meridian in the south of France. These investigations will probably show if any considerable tilt takes place at the same time at both stations. It is thought that the bifilar pendulum may serve to detect the occurrence of sudden displacements in the foundations of observatories.

Award of the Watson Medal.—At Washington a few weeks ago Mr. S. C. Chandler was awarded the Watson medal by the National Academy of Sciences. A description of the founding of the award and the work of previous recipients, given by Mr. John Ritchie, jun., in the *Boston Commonwealth*, recalls a few facts of interest. Prof. J. C. Watson, the founder of the award, was for many years professor of astronomy and physics in the Universities of Michigan and Wisconsin, and for some time previous to his decease was director of the Washburn Observatory at Madison. His treatise on theoretical astronomy is known to every computing astronomer. During the later years of his life he devoted his attention to the minor planets, of which he discovered twelve. It is common knowledge that, at the eclipse of July 29, 1878, he and Dr. Swift reported observations of an intra-mercurial planet, and he believed in the existence of such a body up to his death in 1880. At his death he left his estate, some family legacies excepted, in trust to the National Academy of Sciences, the fund having since been designated the Watson Fund. The amount of money realised was in all some twenty or thirty thousand dollars. The income of this is to be expended for the promotion of astronomical science, specific provision being made for the presentation of a gold medal and a gratuity of one hundred dollars in gold coin, from time to time, to an astronomer who shall have accomplished work of high merit. He nominated as trustees of his fund his friends Hilgard, Coffin and Newcomb, with provision for the appointment of their successors. The high quality of the trust has been continued by the selection of Dr. B. A. Gould and Prof. Asaph Hall as successors to Hilgard and Coffin, who passed away some three years ago. Four medals only have been given: the first to Dr. B. A. Gould in 1887; the second to Prof. Edward Schönfeld, Director of the University of Bonn, in 1888; the third to Dr. Arthur Auwers, of Berlin, in 1891; and the fourth to Mr. Chandler. It need hardly be said that the award was chiefly given to Mr. Chandler for his brilliant investigations on the variations of latitude.

Two New Catalogues.—*Astronomische Nachrichten* No. 3232 contains a long list of stars with remarkable spectra, observed by the Rev. T. E. Espin. The catalogue comprises 167 stars, most of which have not had their spectra previously recorded, 206 stars found to have spectra belonging to Type III., and a list of 136 stars, of which it is doubtful whether they belong to Type II. or III. Nos. 3233–34 of the same publication contain a catalogue of 187 new double stars discovered with the 18½ inch refractor of the Deerhorn Observatory, U.S.A., and measures of 152 double stars, by Prof. G. W. Hough.

THE DENSITY OF NITROGEN GAS.[1]

In a former communication[2] I have described how nitrogen, prepared by Lupton's method, proved to be lighter by about 1/1000 part than that derived from air in the usual manner.

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[1] "On an Anomaly encountered in Determinations of the Density of Nitrogen Gas." A paper read before the Royal Society on April 19, by Lord Rayleigh, Sec. R.S.

[2] "On the Densities of the Principal Gases," *Roy. Soc. Proc.* vol. liii. p. 146, 1893.